Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Previously Presented) A catheter and console combination for mapping a chamber of a heart comprising:

a console comprising driver circuits operatively connected to at least one electromagnetic field generator for generating an electromagnetic field, the console also comprising a signal processor for determining location information;

a catheter comprising:

(i) a body having a proximal end and a distal end, said distal end having a distal tip;

(ii) a contact electrode at said distal tip;

(iii) an array of non-contact electrodes on said distal end of said body, said array having a proximal end and a distal end, wherein said non-contact electrodes are linearly arranged along a longitudinal axis of said body; and

at least one location sensor on said distal end of said body for generating signals in response to the electromagnetic field which is used by the signal processor to determine a location of said contact electrode and a location of said non-contact electrodes, the location of the non-contact electrodes determined by said signal processor from said

signals generated by said at least one location sensor, said signal processor during at least an entire cardiac cycle in a

first mode of operation acquiring first electrical information from only said non-contact electrodes, and in a second mode of operation acquiring second electrical information from said contact electrode and said non-contact electrodes to represent a minimum volume of the chamber geometry of the heart.

2. (Previously Presented) The catheter and console combination of Claim 1 wherein said at least one location sensor is proximate to said catheter distal tip.

3. (Previously Presented) The catheter and console combination of Claim 1 wherein said at least one location sensor comprises a first location sensor and a second location sensor, wherein said array of non-contact electrodes is disposed therebetween, and said second location sensor is disposed proximate to said catheter distal tip.

4. (Canceled).

5. (Previously Presented) The catheter and console combination of Claim 3 wherein at least one of said first location sensor and said second location sensor provides six degrees of location information.

6. (Previously Presented) The catheter and console combination of Claim 5 wherein said first location sensor and said second location sensor each provide six degrees of location information.

7. (Previously Presented) The catheter and console combination of Claim 3 wherein at least one of said first location sensor and said second location sensor is an electromagnetic location sensor.

8. (Previously Presented) The catheter and console combination of Claim 1 wherein said distal tip contact electrode is a bipolar electrode.

9. (Previously Presented) The catheter and console combination of Claim 1 wherein said electrode array comprises from about twelve to about thirty-two non-contact electrodes.

10. (Previously Presented) The catheter and console combination of Claim 9 wherein said array comprises from about sixteen to about twenty-four electrodes.

11. (Previously Presented) The catheter and console combination of Claim 3 wherein said distal tip contact electrode is a bipolar electrode.

12. (Currently Amended) A catheter and console combination comprising:

(a) a console comprising driver circuits operatively connected to at least one electromagnetic field generator for generating an electromagnetic field, the

console also comprising a signal processor for determining location information;

(b) a catheter comprising:

(i) a body having a proximal end and a distal end, said distal end having a distal tip;

an array of non-contact electrodes on said distal end of said body, said array having a proximal end and a distal end; wherein said non-contact electrodes are linearly arranged along a longitudinal axis of said body; and

at least one location sensor proximate to said distal tip for generating signals in response to the electromagnetic field which is used by the signal processor to determine a location of said non-contact electrodes, said at least one location sensor comprising a first location sensor and a second location sensor, said first location sensor being proximate to said catheter distal tip and said second location sensor being proximate to said proximal end of said non-contact electrode array, the location of said non-contact electrodes determined by said signal processor from said signals generated by said at least one location sensor, said signal processor using said location of the non-contact electrodes to represent a minimum volume of the chamber geometry of the heart; wherein said at least one location sensor provides six degrees of location information.

13. (Canceled)

14. (Canceled)

15. (Currently Amended) The catheter and console combination of Claim ~~13~~ 12 wherein at least one of said first location sensor and said second location sensor is an electromagnetic location sensor.

16. (Previously Presented) A method for generating an electrical map of a chamber of a heart, said map depicting an electrical characteristic of the chamber as a function of chamber geometry, said method comprising the steps of:

providing a catheter comprising a body having a proximal end and a distal end, said distal end having a distal tip; a contact electrode at said distal tip; an array of non-contact electrodes on said distal end of said body, said array having a proximal end and a distal end, wherein said non-contact electrodes are linearly arranged along a longitudinal axis of said body; and at least one location sensor on said distal end of said body;

advancing said catheter into said chamber of said heart;

using a signal processor to determine a location of said contact electrode and a location of said non-contact electrodes using said at least one location sensor;

contacting a wall of said chamber of said heart with said contact electrode at a plurality of contact points;

acquiring electrical information and location information from each of said electrodes and said at least one location sensor, respectively, using the signal processor, said acquisition taking place over at least one cardiac cycle while said contact electrode is in contact with each of said contact points; said electrical information comprising first electrical information from said non-contact electrodes and second electrical information from said contact electrode and said non-contact electrodes;

determining a minimum volume of said heart chamber geometry with the signal processor during said at least one cardiac cycle in a first mode of operation by obtaining only said first electrical information from said non-contact electrodes, and in a second mode of operation by obtaining said second electrical information from said contact electrode and said non-contact electrodes; and

generating an electrical map of said heart chamber from said acquired location and one of said first electrical information and said second electrical information.

17. (Previously Presented) The method of Claim 16 wherein said at least one location sensor comprises a first location sensor and a second location sensor, wherein said array of non-contact electrodes is disposed therebetween, and said second location sensor is disposed proximate to said catheter distal tip.

18. (Canceled).

19. (Previously Presented) The method of Claim 17 wherein said second location sensor is proximate to the proximal end of said array of non-contact electrodes.

20. (Original) The method of Claim 19 wherein at least one of said first location sensor and said second location sensor provides six degrees of location information.

21. (Original) The method of Claim 20 wherein said first location sensor and said second location sensor each provide six degrees of location information.

22. (Original) The method of Claim 17 wherein at least one of said location sensors is an electromagnetic location sensor.

23. (Original) The method of Claim 16 wherein said contact electrode is a bipolar electrode.

24. (Original) The method of Claim 16 wherein said array of non-contact electrodes comprises from about twelve to about thirty-two non-contact electrodes.

25. (Original) The method of Claim 24 wherein said array of non-contact electrodes comprises from about sixteen to about twenty-four non-contact electrodes.

26. (Original) The method of Claim 17 including determining said geometry of said heart chamber from the location information provided by of each of said location sensors.

27. (Original) The method of Claim 16 wherein said generating step (e) comprises computing the location of said contact electrode and each of said non-contact electrodes, said locations being the location of said contact electrode and said non-contact electrodes during acquisition of said electrical and location information.

28. (Original) The method of Claim 27 wherein said chamber geometry is derived from the location of said contact electrode and each of said non-contact electrodes during acquisition step (d).

29. (Original) The method of Claim 28 wherein said electrical map is derived from:
(i) The location of said contact electrode and of each of said non-contact electrodes during acquisition of said electrical and location information; and from
(ii) The electrical information acquired by the contact electrode at each of said contact points.

30. (Original) The method of Claim 29 wherein said electrical characteristics intermediate said contact points are derived

from the electrical information acquired from said non-contact electrodes.

31. (Original) The method of Claim 27 wherein said electrical map is derived from:

the location of said contact electrode and of each of said non-contact electrodes during acquisition of said electrical and location information; and from

ii) The electrical information acquired by said contact electrode and each of said non-contact electrodes.

32. (Original) The method of Claim 16, including ablating a portion of said heart chamber based on said electrical map.

33. (Original) The method of Claim 32 which further comprises validating the effectiveness of the ablation procedure.

34. (Original) The method of Claim 33 wherein said validation comprises acquiring additional electrical information from said catheter following said ablation procedure.

35. (Previously Presented) A method for generating an electrical map of a chamber of a heart, said map depicting an electrical characteristic of the chamber as a function of chamber geometry, said method comprising the steps of:

providing a catheter comprising a body having a proximal end and a distal end, said distal end having a distal tip; an

array of non-contact electrodes on said distal end of said body, said array having a proximal end and a distal end, wherein said non-contact electrodes are linearly arranged along a longitudinal axis of said body; and at least one location sensor proximate to said catheter distal tip;

advancing said catheter into said chamber of said heart;

using a signal processor to determine a location of said non-contact electrodes using said at least one location sensor;

contacting a wall of said chamber of said heart with said catheter distal tip at a plurality of contact points;

acquiring electrical information and location information from each of said non-contact electrodes and said at least one location sensor, respectively, using the signal processor, said acquisition taking place over at least one cardiac cycle while said catheter distal tip is in contact with each of said contact points;

determining a minimum volume of said heart chamber geometry with the signal processor using the location of the non-contact electrodes; and

generating an electrical map of said heart chamber from said acquired location and electrical information; wherein said at least one location sensor provides six degrees of location information; and wherein said at least one location sensor comprises a first location sensor and a second location sensor, and said array of non-contact electrodes is disposed therebetween.

36. (Canceled).

37. (Canceled).

38. (Canceled).

39. (Original) The method of Claim 35 including ablating a portion of said heart chamber based on said electrical map.

40. (Original) The method of Claim 39 which further comprises validating the effectiveness of the ablation procedure.

41. (Original) The method of Claim 40 wherein said validation comprises acquiring additional electrical information from said catheter following said ablation procedure.

42. (Previously Presented) Apparatus for generating an electrical map of a chamber of a heart, said map depicting an electrical characteristic of the chamber as a function of chamber geometry, said apparatus comprising:

a console comprising driver circuits operatively connected to at least one electromagnetic field generator for generating an electromagnetic field, the console also comprising a signal processor for determining location information;

a catheter comprising:

a body having a proximal end and a distal end, said distal end having a distal tip; a contact electrode at said distal tip; an array of non-contact electrodes on said distal end of said body, said array having a proximal end and a distal end, wherein said non-contact electrodes are linearly arranged along a longitudinal axis of said body; and at least one location sensor on said distal end of said body for generating signals in response to the electromagnetic field which is used by said signal processor to determine a location of said contact electrode and a location of said non-contact electrodes, the location of the non-contact electrodes determined by said signal processor from said signals generated by said at least one location sensor, said signal processor using said location of the non-contact electrodes to represent a minimum volume of the chamber geometry of the heart; said catheter being adapted to contacting a wall of said chamber of said heart with said contact electrode at a plurality of contact points; said signal processor operatively connected to said catheter for acquiring location information from said–location sensors, and in a first mode of operation acquiring first electrical information only from said non-contact electrodes, and in a second mode of operation acquiring second electrical information from said contact electrode and said non-contact electrodes, over at least one cardiac cycle while said contact electrode is in contact with each of said contact points, said signal processor also generating an electrical

map of said heart chamber from said acquired location information and one of said first electrical information and said second electrical information.

43. (Original) The apparatus of Claim 42 wherein said catheter comprises a first location sensor and a second location sensor.

44. (Original) The apparatus of Claim 43 wherein at least one of said first location sensor and said second location sensor is an electromagnetic location sensor.

45. (Original) The apparatus of Claim 43 wherein said first location sensor is proximate to said catheter distal tip.

46. (Original) The apparatus of Claim 45 wherein said second location sensor is proximate to the proximal end of said electrode array.

47. (Currently Amended) Apparatus for generating an electrical map of a chamber of a heart, said map depicting an electrical characteristic of the chamber as a function of chamber geometry, said apparatus comprising:

(a) console comprising driver circuits operatively connected to at least one electromagnetic field generator for generating an electromagnetic field, the console also comprising a signal processor for determining location information;

(b) catheter comprising:

a catheter including a body having a proximal end and a distal end, said distal end having a distal tip; an array of non-contact electrodes on said distal end of said body, said array having a proximal end and a distal end, wherein said non-contact electrodes are linearly arranged along

a longitudinal axis of said body; and at least one location sensor proximate to said catheter distal tip for generating signals in response to the electromagnetic field which is used by the signal processor to determine a location of said non-contact electrodes, said at least one location sensor comprising a first location sensor and a second location sensor, wherein said array of non-contact electrodes is disposed therebetween, and said second location sensor is disposed proximate to said catheter distal tip, the location of said non-contact electrodes determined by said signal processor for said signals generated by said at least one location sensor, said signal processor using said location of said non-contact electrodes to represent a minimum volume of the chamber geometry of the heart; said catheter being adapted to contacting a wall of said chamber of said heart with said catheter distal tip at a plurality of contact points; said signal processor acquiring electrical information and location information from each of said electrodes and location sensors, respectively, over at least one cardiac cycle while said catheter distal tip is in contact with each of said contact points; said signal processor also generating an

electrical map of said heart chamber from said acquired location and electrical information, wherein said at least one location sensor provides six degrees of location information.

48. (Canceled)

49. (Currently Amended) The apparatus of Claim 47 wherein at least one of said first location sensor and said second location sensor is an electromagnetic location sensor.

50. (Canceled).

51. (Canceled).